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10th Jubilee Plant Sulfur Workshop
Plant Sulfur Metabolism in Higher Plants
Fundamental, Environmental and Agricultural Aspects

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September 1-4, 2015

PROGRAMME AND ABSTRACTS

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Goslar, Germany, September 1-4, 2015
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(P4) The effect of excess sulfate supply on iron accumulation in three graminaceous plants

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In recent years it has been established a significant relationship between sulfur (S) and iron (Fe) nutrition. In particular, it has been demonstrated that S deprivation can hinder Fe acquisition in barley, maize and wheat. This can be explained by assuming that to cope with low Fe availability in the soil grasses have evolved a phytosiderophores (PS)-based Fe chelation system (Strategy II) and PS are synthesized from methionine, through a nicotianamine intermediate. On the other hand, it has been demonstrated that wheat plants exhibit a higher Fe accumulation when supplied with excess S concentration, this effect being especially beneficial under severely limited Fe supply (Zuchi et al., (2012) *Env. Exp. Bot.* 77: 25-32). The goal of this study was to explore whether the higher ability to acquire Fe, induced by a higher S supply, might be a general response of graminaceous species. The response of durum wheat (*Triticum durum* L.), barley (*Hordeum vulgare* L.), and maize (*Zea mays* L.) to excess S availability (2.4 mM) was studied as a function of Fe availability (limited and sufficient, 20 and 80 μ M, respectively). At the end of the experimental period, which lasted 11 days, growth parameters (shoot and root fresh weight and chlorophyll content), total S and Fe concentrations, and PS release rate were compared among the three species. Furthermore, we evaluated plant sulfate uptake capacity, by analysing the expression of genes coding for high affinity sulfate transporter (*TdST1.1*, *HvST1.1* and *ZmST1.1*) in roots of each graminaceous plant. Our preliminary findings are largely consistent with the apparent divergence among the three species. In particular, an excess S supply may result in the improvement of Fe-use efficiency in durum wheat plants, but not in both barley and maize. It is clear that further research is needed to explain the differences in these species in their response to changes in S supply and in their ability to acquire and accumulate Fe. However, the use of higher S supply seems to be a promising approach at least for wheat cultivation, which can both reduce agricultural demand for Fe fertilizer and improve the Fe-use efficiency of plants.